9-24-08 1FW AF

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Applicants:	SHANKS, Steven C. and TUCEK, Kevin B.		
Title of Invention:	Multi-Probe Device		
Filed:	July 1, 2003		
Serial Number:	10/612,504	**Examiner**: Henry M. Johnson, III	
Atty Docket No.:	206-038	**Art Unit:** 3739	

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Date 9/23/08 Sandra L. Etherton

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REPLY BRIEF

Mail Stop Appeal Brief
Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

An Examiner's Answer was mailed on July 29, 2008, which requires a reply brief to be filed within two months. This Reply Brief is submitted on or before September 29, 2008 and is therefore considered timely filed. No fee is believed due.

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REPLY BRIEF

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Continental Can Co. USA Inc. v. Monsanto Co., 948 F.2d 1264, 20 USPQ2d 1746 (Fed. Cir. 1991)

In re Gurley, 27 F.3d 551, 31 USPQ2d 1130 (Fed. Cir. 1994)

In re Icon Health and Fitness, Inc., 496 F.3d 1374, 83 USPQ2d 1746 (Fed. Cir. 2007)

In re Oelrich, 666 F.2d 578, 212 USPQ 323 (CCPA 1981)

In re Schreiber, 128 F.3d 1473, 44 USPQ2d 1429 (Fed. Cir. 1997)

In re Swinehart, 439 F.2d 210, 169 USPQ 226 (CCPA 1971)

KSR Int'l Co. v. Teleflex Inc., 550 U.S. ____, 127 S.Ct. 1727, 82 USPQ2d 1385 (2007)

McGinley v. Franklin Sports, Inc., 262 F.3d 1339, 60 USPQ2d 1001 (Fed. Cir. 2001)

MEHL/Biophile Int'l Corp. v. Milgraum, 192 F.3d 1362, 52 USPQ2d 1303 (Fed. Cir. 1999)

Schering Corp. v. Geneva Pharms., Inc., 339 F.3d 1373, 67 USPQ2d 1664 (Fed. Cir. 2003)

United States v. Adams, 383 U.S. 39,148 USPQ 479 (1966)

Verdegaal Bros, Inc. v. Union Oil Co. of California, 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 827 (1987)

List of References

R-1 U.S. Patent 6,074,411 issued to Lai (referred to herein as "Lai")

R-2 Appeal Brief dated August 2, 2006

R-3 Appeal Brief dated March 5, 2007

R-4 U.S. Patent 6,267,779 issued to Gerdes (referred to herein as "Gerdes")

R-5 U.S. patent 5,653,706 issued to Zavislan (referred to herein as "Zavislan")

R-6 Applicants' Specification of U.S. Patent App. No. 10/612,504, as amended, and Drawings

Copies of the references above are included in the References Cited Appendix

Manual of Patent Examining Procedure, Eighth Edition, August 2001, Rev. 4 October 2005

MPEP §2114

MPEP §2142

I. Reply Arguments

A. Lai Does Not Anticipate Applicants' Claims Under 35 USC 102(b).

The Examiner argues that Applicant's claims 1, 2, 8-10, 13-15, and 22 are anticipated by Lai. In particular, the Examiner argues that:

(1) Lai anticipates Applicants' claimed invention because Lai discloses the structural elements recited in Applicants' claims; and

(2) Lai anticipates Applicants' claimed invention because Lai inherently discloses beam shaping optics and spot shapes.

Applicants continue to respectfully disagree with the Examiner's arguments.

Principles of Law Relating to Anticipation & Inherency

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros., Inc. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 827 (1987).

When determining the elements or limitations of a claim, it is well-established law that a patent applicant can recite features of his invention either structurally or functionally. *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997); MPEP §2114. When an element is defined functionally, however, it may be anticipated by a prior art structure if the prior art structure inherently discloses the functionally claimed element. *In re Schreiber* at 1478, 44 USPQ2d at 1432 (citing *In re Swinehart*, 439 F.2d 210, 213, 169 USPQ 226, 228 (CCPA 1971)).

The Federal Circuit has explained that, to establish that a characteristic is inherently disclosed by a prior art reference, the inherent characteristic must be a "necessary and inevitable" consequence of the disclosure in a prior art reference.

Schering Corp. v. Geneva Pharms., Inc., 339 F.3d 1373, 1378-80, 67 USPQ2d 1664 (Fed. Cir. 2003); *Continental Can Co. USA Inc. v. Monsanto Co.*, 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991). It is not sufficient to show that the prior art would probably, or possibly, produce the undisclosed element. *Continental Can* at 1269, 20 USPQ2d at 1749; see also *MEHL/Biophile Int'l Corp. v. Milgraum*, 192 F.3d 1362, 1365, 52 USPQ2d 1303, 1305 (Fed. Cir. 1999) ("Occasional results are not inherent.").

An instructive example of an inherent anticipation analysis by the Federal Circuit can be found in *MEHL/Biophile.* 192 F.3d at 1362. *In MEHL/Biophile*, a disputed patent claim required that a laser light applicator be aligned substantially vertically over a hair follicle opening. *MEHL/Biophile* at 1364. One of the prior art references was an instruction manual that described the use of a laser to remove tattoos but was silent as to applying the laser to hair follicles and as to vertical alignment therewith. *Id.* at 1364. The Federal Circuit found that the manual did not inherently disclose vertical alignment of the laser light applicator because the operator of the prior art laser could "use the laser according to the manual without necessarily aligning the laser 'substantially vertically over a hair follicle opening.'" *Id.* at 1365. The Federal Circuit explained that "[t]he *possibility* of such an alignment does not legally suffice to show anticipation." *Id.* (citing *In re Oelrich,* 666 F.2d 578, 581 212 USPQ 323, 326 (CCPA 1981) (emphasis added).

1. Lai does not expressly or inherently disclose freely moving probes while emitting laser beams.

Applicants disagree with the Examiner that, because Lai discloses the structural components of Applicants claims, Lai anticipates Applicants' claims. Consistent with the teachings of *In re Schreiber* presented above, Applicants describe an element of their

claimed invention in functional terms: each of two or more handheld probes "emits one or more laser beams . . . while being freely moved by a user's hand relative to the surface of the skin of a patient."[1] The appropriate question then becomes whether the prior art inherently discloses freely moving multiple laser probes while they emit laser beams.

Lai does not inherently disclose freely moving laser probes while they emit laser beams. Lai does not even teach a device capable of being freely moved by hand while emitting laser beams. Rather, Lai emphasizes that its laser modules must be pointed directly at an acupuncture point and that self-adhesive holders are configured to securely hold the laser module at the acupuncture point. *See* Lai, col. 2, lines 21-28. The Examiner asserts that Figure 2 of Lai discloses an embodiment of Lai's laser module that operates without the adhesives. Figure 2, however, simply illustrates the laser module onto which the adhesive holder is applied. *See* Lai, col. 2, lines 21-31 and 57-59. There is nothing in Lai's disclosure that indicates Lai's laser modules are capable of emitting laser beams while they are freely moved.

Even assuming, arguendo, that the laser modules of Lai are considered capable of freely moving during operation, it does not follow that Lai's laser modules *necessarily* emit one or more laser beams while being freely moved by a user's hand. Moreover, freely moving laser probes while they are emitting light is in no way the inevitable result of practicing Lai's invention. The laser modules taught by Lai operate on a timer-controlled switch, which can easily control the laser module so that it only emits laser beams after being placed and secured on the patient's acupuncture sites. *See* Lai, co. 3, lines 11-14. As with the prior art instruction manual in *MEHL/Biophile*, Lai is silent on

[1] *See* Applicants' claim 1.

whether its laser modules are freely movable while emitting laser light. Accordingly, the mere *possibility* that the laser modules disclosed in Lai could be moved while emitting laser light is insufficient to establish inherent anticipation.

Because Lai fails to expressly or inherently disclose handheld probes that are freely moveable during laser operation, Lai cannot anticipate Applicants' claims 1, 2, 8-10, 13-15 and 22.

2. Lai does not expressly or inherently disclose a beam-shaping apparatus or a spot shape.

Applicants respectfully disagree with the Examiner's arguments that Lai teaches the use of optics and that beams inherently must have some shape.

As detailed in Applicants' earlier briefs,[2] Lai discloses only focusing optics. Contrary to the Examiner's assertions, protective lenses and focusing optics do not necessarily or inevitably create beam shapes. Focus refers to how clear or fuzzy the image is, whereas shape refers to the perimeter geometry of the image as it impinges the patent's skin. A device can emit a laser beam that is in or out of focus, and focusing the beam will not change the resultant shape. Similarly, a protective lens simply protects the laser diode without changing the resultant shape of the laser beam. Neither protective lenses nor focusing optics necessarily provide an apparatus for obtaining a desired perimeter or spot shape. Accordingly, beam-shaping optics are not inherent in focusing optics or a protective lens.

[2] *See* August 2, 2006 Appeal Brief pp. 17-22 and March 5, 2007 Appeal Brief, p. 15, attached hereto as R-2 and R-3 respectively.

Because Lai fails to expressly or inherently disclose an optical arrangement for transforming a laser beam into a desired beam shape, Applicants' claims 1, 2, 8-10, 13-15 and 22 are not anticipated by Lai.

3. Conclusion

Applicants have shown that Claims 1, 2, 8-10, 13-15 and 22 are not anticipated under 35 USC 102(b) by Lai, and reversal of the rejection is respectfully requested.

B. Applicant's Claims Are Not Obvious Under 35 USC 103(a) in Light of U.S. Patent 6,267,779 Issued to Gerdes in View of U.S. Patent 5,653,706 Issued to Zavislan et al.

The Examiner argues that Applicant's claims 1-10, 13-30 and 32 are unpatentable over U.S. Patent 6,267,779 issued to Gerdes (hereinafter "Gerdes") in view of U.S. Patent 5,653,706 issued to Zavislan et al. (hereinafter "Zavislan").[3] The Examiner makes a number of arguments: that Zavislan is analogous art; that Gerdes and Zavislan do not teach away from Applicants' invention; that Gerdes and Zavislan inherently disclose elements of applicants' claims; and that Gerdes expressly teaches ultraviolet radiation and a variety of spot shapes. Applicants respectfully continue to disagree with the Examiner's arguments.

Principles of Law Relating to Obviousness & Inherency

A claim is *prima facie* obvious only if an analogous prior art reference (or references when combined) teaches or suggests all the claim limitations. MPEP §2142. According to the Supreme Court, in the recent case *KSR Int'l Co. v. Teleflex Inc.*, when combining references there must be "a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new

[3] Gerdes and Zavislan are attached hereto as References R-4 and R-5 respectively.

invention does." 550 U.S. ___, 14, 127 S.Ct. 1727, 1741, 82 USPQ2d 1385 (2007). Moreover, the Supreme Court instructs that "when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious." *Id.* at 12, 127 S.Ct. at 1739 (citing *United States v. Adams,* 383 U.S. 39, 51-52, 148 USPQ 479 (1966)).

In applying the *KSR* decision to a recent case, the Federal Circuit instructed that a prior art reference may be said to teach away from a combination or invention when a person of ordinary skill, upon reading of the reference, would be discouraged from following the path set out in the reference or would be led in a different direction from the path that was taken by the applicant. *In re Icon Health and Fitness, Inc.*, 496 F.3d 1374, 1381, 83 USPQ2d 1746 (Fed. Cir. 2007) (quoting *In re Gurley*, 27 F.3d 551, 553, 31 USPQ2d 1130 (Fed. Cir. 1994) and citing *KSR* at 12, 127 S.Ct. at 1739-40). "Additionally, a reference may teach away from a use when that use would render the result inoperable." *Id.* (citing *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1354, 60 USPQ2d 1001 (Fed. Cir. 2001)).

Where a reference is alleged to inherently teach an element, the Federal Circuit has explained that the inherent characteristic must be a "necessary and inevitable" consequence of the disclosure in a prior art reference. *Schering* at 1378-80; *Continental Can* at 1268, 20 USPQ2d at 1749. It is not sufficient to show that the prior art would probably, or possibly, produce the undisclosed element. *Continental Can* at 1269, 20 USPQ2d at 1749; see also *MEHL/Biophile* at 1365, 52 USPQ2d at 1305 ("Occasional results are not inherent.").

1. Zavislan is not analogous art.

Applicants respectfully disagree with the Examiner that Zavislan is analogous art. While Zavislan teaches a single handheld laser device, it teaches one in an entirely different field that solves an unrelated problem, as detailed in Applicants' prior brief.[4] Zavislan's disclosure and Applicants' invention are in different fields of endeavor and, although both involve laser radiation, therapeutic lasers and surgical lasers cause dramatically different results on a patient's body and must therefore be designed considering different parameters and safety concerns. Accordingly, Zavislan is non-analogous art, and Applicants' claims 1-10, 13-30, and 32 are not obvious over Gerdes in view of Zavislan.

2. Zavislan teaches away from multiple wands.

Applicants respectfully disagree with the Examiner that, despite teaching away, Zavislan can be combined with Gerdes because Zavislan is merely cited for the teaching of mounting a laser within a probe. As detailed in Applicants' prior brief,[5] Zavislan teaches away from using multiple wands because it discloses a high power laser for ablative dermatology treatments, and multiple ablative wands cannot safely be used by hand: a practitioner can't see two places simultaneously to cut two places simultaneously. Because Zavislan teaches technology requiring different design parameters and considerations than those facing low-power therapeutic laser device developers, a person skilled in the art of therapeutic laser devices would be discouraged by the path set out in Zavislan. Accordingly, Applicants' claims 1-10, 13-30, and 32 are not obvious over Gerdes in view of Zavislan.

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[4] *See* March 5, 2007 Appeal Brief, pp. 16-18, 25-27 and 31-33.
[5] *See* March 5, 2007 Appeal Brief, pp. 18-20, 27-28 and 33-34.

3. Zavislan and Gerdes teach away from freely moving the probes.

Applicants respectfully disagree with the Examiner that the laser probes disclosed in Zavislan and Gerdes are capable of freely moving while emitting laser beams. Applicants further assert that Zavislan and Gerdes teach away from freely moving probes that emit laser beams.

First, neither Zavislan nor Gerdes inherently disclose that multiple handheld wands are capable of being freely movable while emitting laser beams. Zavislan's teachings do not necessarily or inevitably require free movement of its laser while it is operating. Rather, according to Zavislan, the laser is operated after the laser module is positioned over the treatment area. *See* Zavislan, col. 4, lines 55-60. Similarly, the laser probes in Gerdes also do not necessarily or inevitably permit free movement during radiation. Gerdes describes sophisticated software for controlling the operation of the therapeutic lasers so that they are only energized once the laser wands are placed in the proper position. *See* Gerdes, col. 12, lines 2-52. Moreover, Gerdes discloses an automatic positioning device that holds the laser wands so that their beams properly intersect. *See* Gerdes, col. 13, lines 22-35. Zavislan and Gerdes both expressly disclose how to operate their laser probes *without* achieving free movement during laser operation.

Second, combining the teachings of Zavislan and Gerdes to achieve Applicants' invention is not obvious or even sensible. Taking a high-power ablative laser as disclosed by Zavislan and combining it with multiple lasers intended to intersect as disclosed by Gerdes and then further adapting them to freely move while they are

emitting laser beams would be impractical, contrary to the express purposes of Gerdes and Zavislan, and highly dangerous. The fact that neither Gerdes nor Zavislan includes the interlocks described by the Examiner only further supports Applicants' position that the laser probes in Gerdes and Zavislan were never intended or even contemplated to be freely moved while emitting laser light.

Because both Gerdes and Zavislan do not inherently disclose, and rather teach away from, freely moving hand-held probes while they emit laser beams, Applicants' claims 1-10, 13-30, and 32 are not obvious over Gerdes in view of Zavislan.

4. Zavislan and Gerdes teach away from emitting two laser beams simultaneously and impinging two different parts of a patient's body.

Applicants respectfully disagree with the Examiner that Gerdes discloses laser probes capable of simultaneously impinging two different places on a patient. Gerdes does not inherently disclose simultaneously laser treating two different places, and both Gerdes and Zavislan teach away from it.

First, Gerdes does not inherently disclose that its laser beams are capable of impinging two different parts of a patient's body. Rather, simultaneously treating multiple areas of a patient is expressly discouraged rather than being a necessary or inevitable result of practicing Gerdes' teachings. Gerdes teaches a device wherein the wands are positioned over the patient in such a manner that the radiation from the wands intersect in one area for the desired treatment of the patient. Moreover, Gerdes teaches significant safety measures to ensure its lasers are correctly intersecting prior to radiation and even discloses an apparatus for securing the laser modules in such a position. *See* Gerdes, col. 12, lines 2-52, and col. 13, lines 22-35.

Second, as explained above, Zavislan teaches an ablative laser device wherein the wand is visually positioned over a treatment area where microsurgery is desired, and it would be impractical, possibly even dangerous, to simultaneously treat multiple areas on the patient. A person of ordinary skill in the art would not consider Zavislan's teachings as appropriate for modifying Gerdes to achieve Applicants' claimed invention. Accordingly, Applicants' Claim 2 is not obvious over Gerdes in view of Zavislan.

5. Gerdes does not teach using ultraviolet laser light.

Applicants respectfully disagree with the Examiner that Gerdes teaches the use of ultraviolet light. As detailed in Applicants' prior brief,[6] ultraviolet light ranges from about 4 nm to less than 400 nm, just beyond violet in the visible spectrum of light. Gerdes only discloses aiming *visible* radiation having a wavelength of between approximately 400 nm and 700 nm. It is well known that ultraviolet light is not visible light. See, e.g., RANDOM HOUSE UNABRIDGED DICTIONARY 2051 (2d ed. 1993) (defining ultraviolet as "beyond the violet in the spectrum, corresponding to light having wavelengths shorter than 4000 angstrom units). Furthermore, Gerdes only discloses visible light. Therefore, Gerdes does not teach or suggest an ultraviolet wavelength, and Applicants' claims 16 and 29 are not obvious over Gerdes in view of Zavislan.

6. Gerdes does not teach various spot shapes.

Applicants respectfully continue to disagree with the Examiner that Gerdes teaches a variety of spot shapes. As detailed in Applicants' prior brief, [7] Gerdes only discloses that "a wide variety of feathered, diffused, Fresnel, traced, and other types of spread-out patterns are also suitable for use with the present invention." A linear spot

[6] *See* March 5, 2007 Appeal Brief, pp. 22-24 and 29-30.
[7] *See* March 5, 2007 Appeal Brief, pp. 24-25.

shape and plus-sign spot shape, however, are not "spread out." Therefore, Gerdes does not disclose or suggest a line or plus-sign spot shape, and Applicants' claims 17, 19, and 21 are not obvious over Gerdes in view of Zavislan.

7. Conclusion

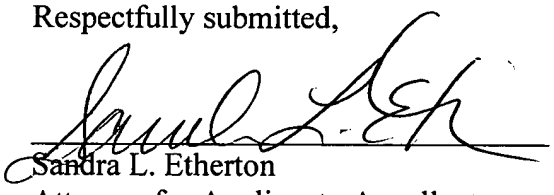
Applicants have shown that Claims 1-10, 13-30, and 32 are not obvious under 35 USC 103(a) in light of Gerdes and Zavislan for one or more reasons explained above. Reversal of the rejections is respectfully requested.

II. Conclusion

Applicants believe they have shown that none of the Examiner's rejections in the pending application should be sustained. Applicants respectfully request that the Board reverse all the Examiner's rejections and allow the case to proceed to issuance.

Date: 9/23/08

Respectfully submitted,



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Claims Appendix

1. A multi-probe device comprising:

   a) two or more laser energy sources, each generating one or more laser beams;

   b) two or more handheld probes from which the laser beams emit, wherein:

      i. each of the handheld probes houses one or more laser energy sources therewithin;

      ii. each of the handheld probes emits one or more laser beams, and each of the handheld probes is not connected to a support structure while being freely moved by a user's hand relative to the surface of the skin of a patient; and

   c) an optical arrangement attached to each handheld probe for receiving one or more laser beams and for transforming each of the laser beams into a desired spot shape.

2. A device according to claim 1 wherein at least two of the laser beams are emitted simultaneously and impinge two different parts of a patient 's body.

3. A device according to claim 1 further comprising one or more control circuits for independently controlling each of the generated laser beams.

4. A device according to claim 1 further comprising a control circuit for controlling the pulse repetition rate of each laser beam.

5. A device according to claim 4 wherein the pulse repetition rate of at least one of the laser beams is such that the laser light emitted is substantially continuous.

6. A device according to claim 4 further comprising a first laser beam having a first pulse repetition rate and a second laser beam having a second pulse repetition rate wherein the first pulse repetition rate and the second pulse repetition rate are different.

7. A device according to claim 4 further comprising a first laser beam having a first pulse repetition rate and a second laser beam having a second pulse repetition rate wherein the first pulse repetition rate and the second pulse repetition rate are the same.

8. A device according to claim 1 wherein each of the laser energy sources is less than one watt.

9. A device according to claim 1 wherein at least one of the laser energy sources is a semiconductor diode.

10. A device according to claim 1 further comprising a base.

13. A device according to claim 1 wherein at least one laser energy source generates a laser beam having a wavelength in the visible range.

14. A device according to claim 13 wherein the wavelength of the laser beam is in the red range of the visible spectrum.

15. A device according to claim 1 wherein at least one laser energy source generates a laser beam having a wavelength in the infrared range.

16. A device according to claim 1 wherein at least one laser energy source generates a laser beam having a wavelength in the ultraviolet range.

17. A device according to claim 1 wherein at least one of the spot shapes is substantially linear.

18. A device according to claim 1 wherein at least one of the spot shapes is substantially circular.

19. A device according to claim 1 wherein at least one of the spot shapes is substantially in the shape of a plus-sign.

20. A device according to claim 1 wherein at least one of the spot shapes is substantially elliptical.

21. A device according to claim 1 further comprising a first laser beam having a first spot shape and a second laser beam having a second spot shape wherein the first spot shape is different from the second spot shape.

22. A device according to claim 1 further comprising a first laser beam and a second laser beam having the same spot shape.

23. A therapeutic laser device comprising:

a) a first semiconductor diode laser energy source generating a first laser beam and a second semiconductor diode laser energy source generating a second laser beam;

b) a first handheld probe from which the first laser beam emits, the first handheld probe having an interior cavity that houses the first semiconductor laser energy source therewithin and that is freely moved by the user's hand relative to the surface of the skin of a patient while emitting the first laser beam;

c) an optical arrangement mounted in the interior cavity of the first handheld probe for receiving the first laser beam and for transforming the first laser beam into a desired spot shape;

d) a second handheld probe from which the second laser beam emits, the second handheld probe having an interior cavity that houses the second semiconductor laser energy source therewithin and that is freely moved by the user's hand relative to the surface of the skin of a patient and relative to the first handheld probe while emitting a laser beam;

e) an optical arrangement mounted in the interior cavity of the second handheld probe for receiving the second laser beam and for transforming the second laser beam into a desired spot shape; and

f) a control circuit for independently controlling each of the generated laser beams; and

g) wherein the first and second handheld probes are not connected to a support structure while being freely moved relative to the surface of the skin of a patient.

24. A device according to claim 23 further comprising a base.

25. A device according to claim 24 wherein the control circuit is housed in the base.

26. A device according to claim 23 wherein at least one laser energy source generates a laser beam having a wavelength in the visible range.

27. A device according to claim 26 wherein the wavelength of the laser beam is in the red range of the visible spectrum.

28. A device according to claim 23 wherein at least one laser energy source generates a laser beam having a wavelength in the infrared range.

29. A device according to claim 23 wherein at least one laser energy source generates a laser beam having a wavelength in the ultraviolet range.

30. A multi-probe device comprising:

a) two or more laser energy sources housed in two or more handheld probes for generating two or more laser beams of only visible light wherein each beam of visible light is emitted at a different wavelength from the other beams of visible light;

b) wherein each of the handheld probes is retained in a hand of a user and freely moved relative to the surface of the skin of a patient; and

c) an optical arrangement attached to each handheld probe for receiving the laser beams and for transforming each of the laser beams into a desired spot shape.

32. A device according to claim 30 wherein the wavelengths of the laser beams are in the red range of the visible spectrum.

US006074411A

United States Patent [19]

Lai et al.

[11] Patent Number: 6,074,411

[45] Date of Patent: Jun. 13, 2000

[54] **MULTIPLE DIODE LASER APPARATUS AND METHOD FOR LASER ACUPUNCTURE THERAPY**

[76] Inventors: **Ming Lai; Meijuan Yuan,** both of 2705 Avenida De Anita, #31, Carlsbad, Calif. 92008

[21] Appl. No.: **09/055,420**

[22] Filed: **Apr. 4, 1998**

[51] **Int. Cl.**[7] **A61N 5/00**

[52] **U.S. Cl.** **607/89**; 607/90

[58] **Field of Search** 607/3, 45–48, 607/88, 89, 90; 600/26, 27; 604/116; 606/2, 10, 13, 17

[56] **References Cited**

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5,755,752 5/1998 Segal 608/89

5,879,373 3/1999 Roper et al. 600/322

OTHER PUBLICATIONS

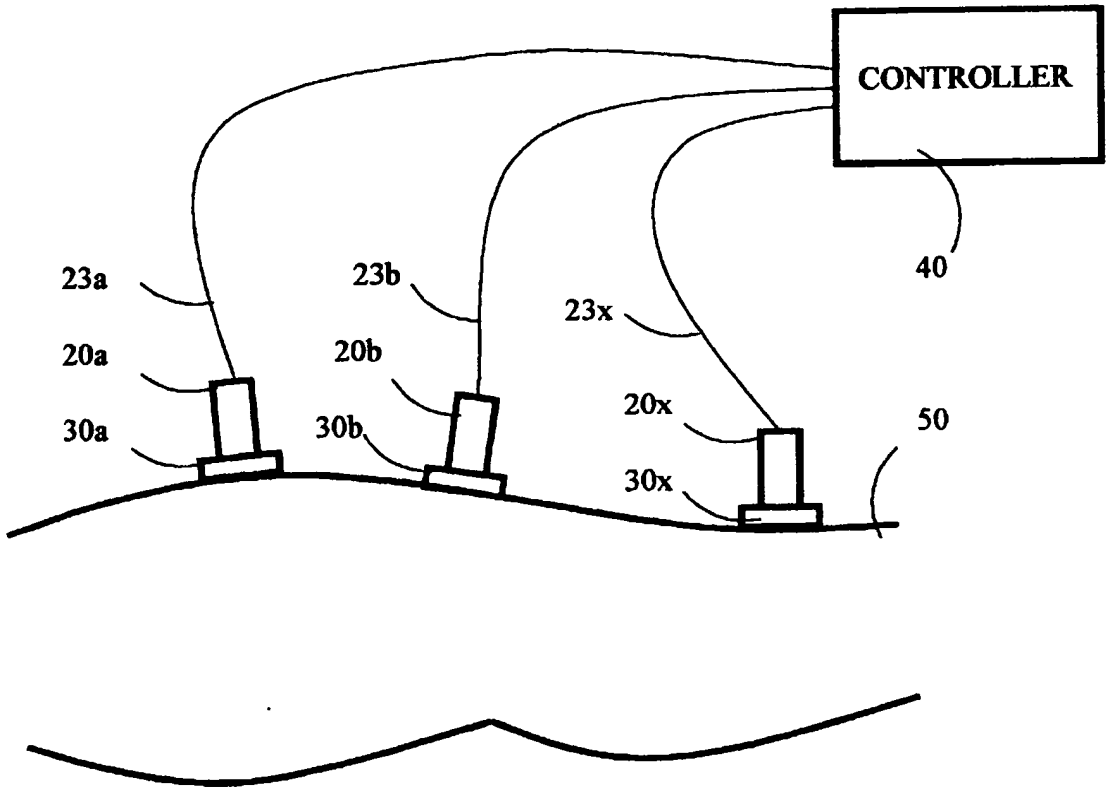
Product Specification of He–Ne Physiotherapeutic Lasers.

Primary Examiner—Linda C. M. Dvorak
Assistant Examiner—Bryan K. Yarnell

[57] **ABSTRACT**

A laser apparatus and method is described for laser acupuncture therapy. A plurality of diode laser modules, a self-adhesive holder for each of the modules, and a timer-controlled power supply are implemented.

13 Claims, 4 Drawing Sheets



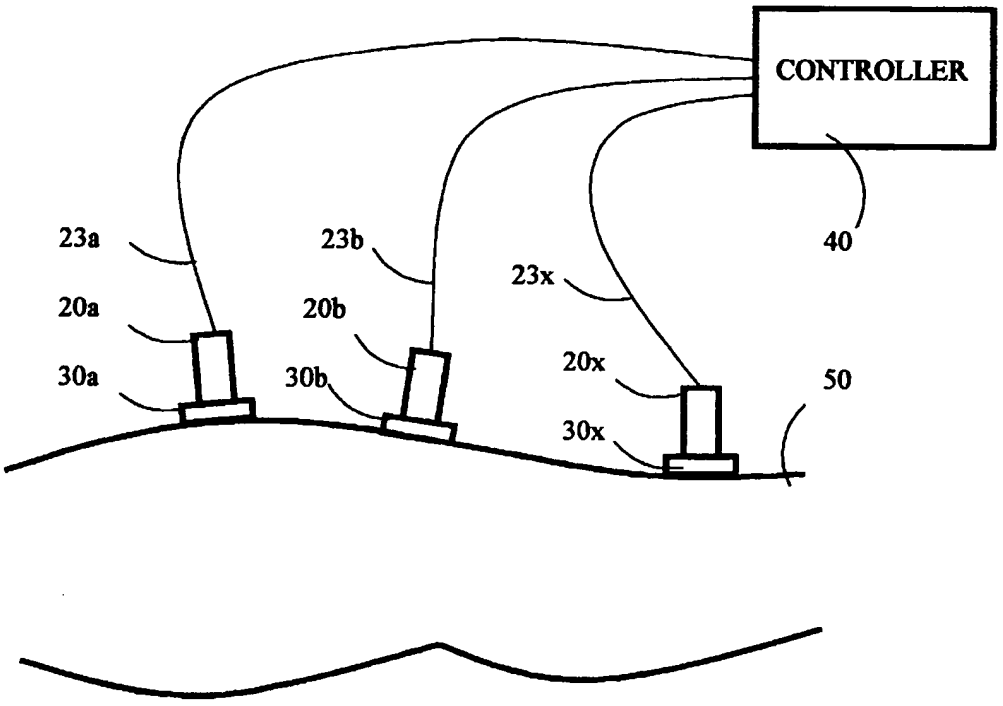


FIGURE 1

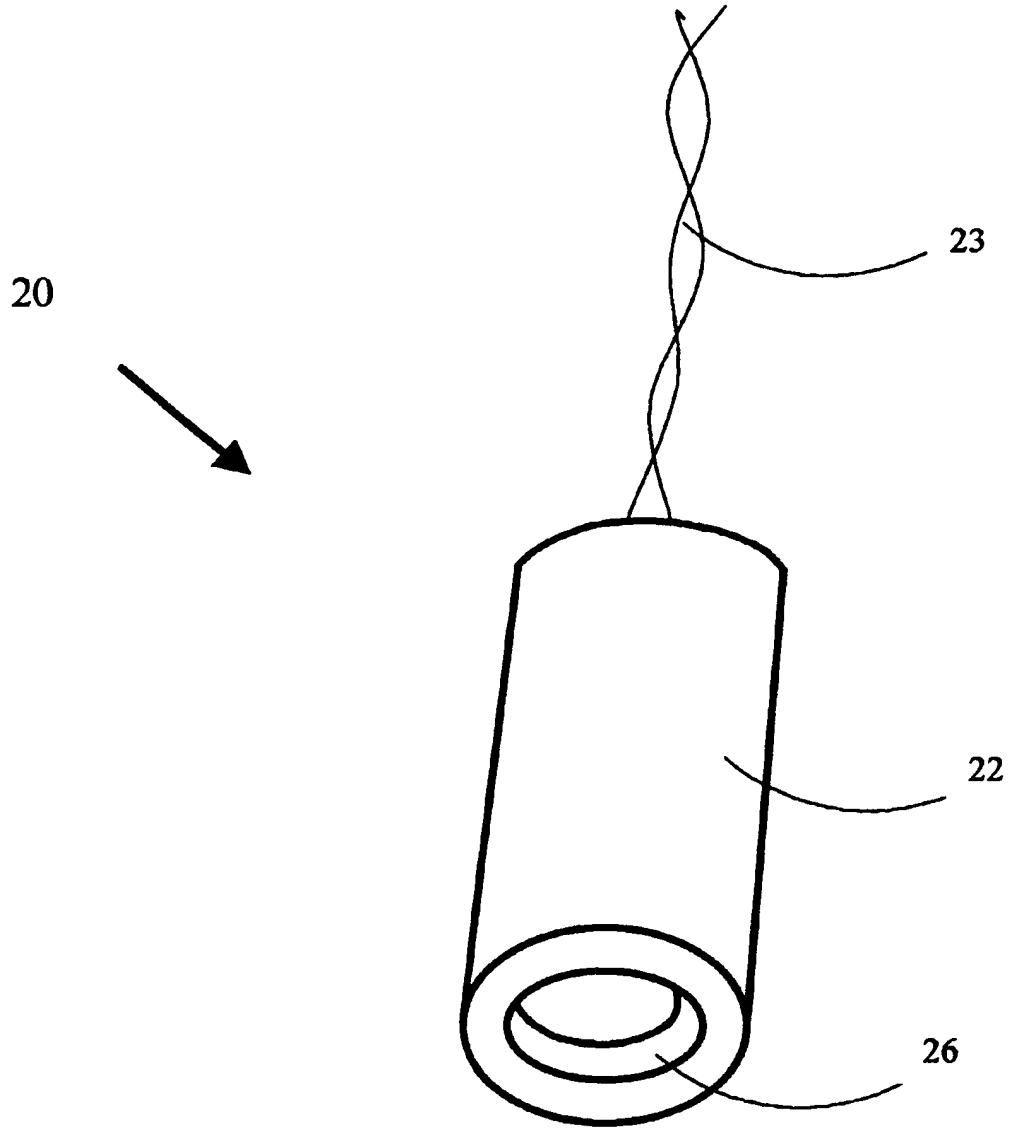


FIGURE 2

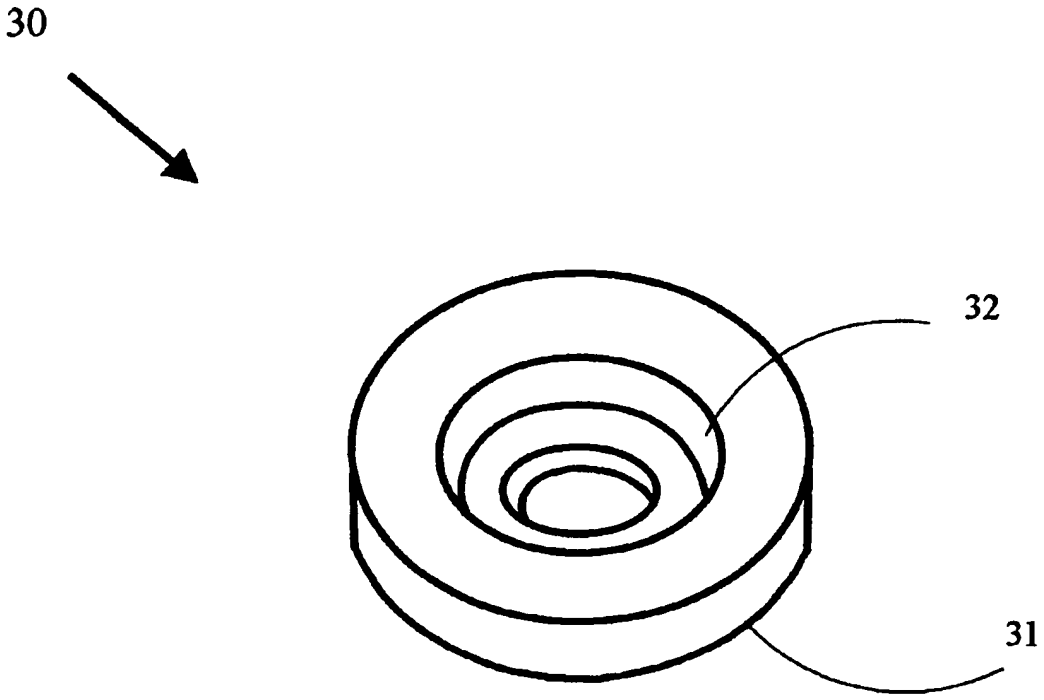


FIGURE 3

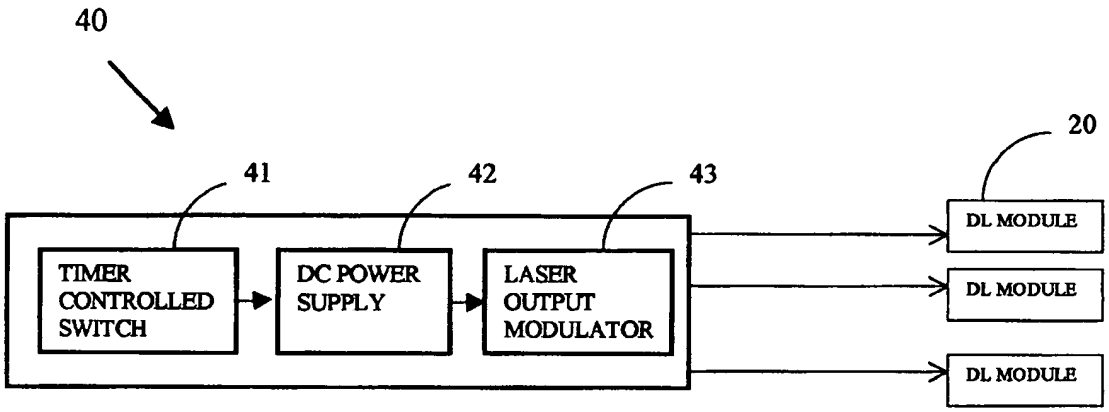

40
41
42
43
20
TIMER CONTROLLED SWITCH
DC POWER SUPPLY
LASER OUTPUT MODULATOR
DL MODULE
DL MODULE
DL MODULE
CONTROLLOR

FIGURE 4

MULTIPLE DIODE LASER APPARATUS AND METHOD FOR LASER ACUPUNCTURE THERAPY

FIELD OF THE INVENTION

The present invention relates to a laser device. In particular, the present invention relates to a laser device for acupuncture therapy.

BACKGROUND OF THE INVENTION

Laser acupuncture therapy has been used as an alternative or complementary treatment of traditional acupuncture therapy. In a laser acupuncture therapy, a low power laser beam is used to replace a needle to stimulate an acupuncture point on a patient's body. It has proven effectiveness in many treatments and is less painful comparing to traditional needle treatment.

Various laser devices have bean developed and used for acupuncture treatment based on such lasers as He—Ne or diode lasers. These laser acupuncture devices implement one or two laser output channels delivered from a hand-held applicator. One design of the hand-held applicator is described by Landers et al. in U.S. Pat. No. D363,129.

To use these devices, a therapist needs to hold the applicator steadily to point the laser beam onto an acupuncture point. In an acupuncture treatment, stimulating five to ten acupuncture points are common and each point takes typically five to thirty minutes. Thus, a therapist needs to point the laser beam to one acupuncture point then another for a long time. Obviously, using these devices is inconvenient and is time consuming.

SUMMARY OF THE INVENTION

A primary objective of the present invention is to make a user friendly device for laser acupuncture therapy. The present invention is embodied in a laser device having a plurality of diode laser modules, a self-adhesive holder for each of the modules to be attach onto a patient's body, and a timer-controlled controller to power all the modules.

Each of the diode laser modules houses a diode laser to produce a laser beam at a selected wavelength. The diode laser module is preferably compact and light.

The self-adhesive holder is attachable to the diode laser module and is configured to hold the diode laser module. It has an adhesive surface and allows to attach a diode laser module onto an acupuncture point of a body part free of hand holding.

The controller is electrically connected to the diode laser modules and configured to provide electrical power to the diode lasers and to modulate the output power of the laser beams. A timer controlled switch is further implemented into the power supply controller for automatically controlling the duration of the treatments.

A laser device in accordance with the present invention thus enables a therapist to stimulate many acupuncture points simultaneously and to treat several patients at the same time. These and other aspects and advantages of the invention will become more apparent in the following drawings, detailed description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic diagram of one embodiment of the present invention;

FIG. 2 is a schematic diagram showing one embodiment of a diode laser module;

FIG. 3 is a schematic diagram showing a self-adhesive holder;

FIG. 4 is a block diagram showing a controller.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a schematic diagram of a laser device **10** according to one embodiment of the present invention. A plurality of diode laser modules **20***a* through **20***x* is attached onto a patient's body part **50** by a set of self-adhesive holders **30***a* through **30***x*. Any number of diode laser modules may be used. Five to ten modules are preferred to treat multiple acupuncture points at the same time. Each diode laser module (e.g., **20***a*, **20***b*, and **20***x*) is connected electrically to a controller **40** by an electrical link (e.g., **23***a*, **23***b*, and **23***x*). The controller **40** provides electrical power to the diode laser modules and modulates the output power of each diode laser. The controller **40** may include a timer to automatically switch on or off the power to the diode laser modules.

In operation, a therapy laser beam produced by a diode laser module (e.g., **20***a*) is pointed directly at an acupuncture point. The laser power can be automatically modulated by the controller **40** to meet different requirements for a variety of laser acupuncture treatments. The self-adhesive holder (e.g., **30***a*) is configured to securely hold the diode laser module and to maintain the laser beam at the acupuncture point. Such holding mechanism is particularly advantageous since it eliminates the need for hand holding the laser module and allows the therapist to perform other tasks.

FIG. 2 depicts one embodiment **20** of a diode laser module. The diode laser module **20** has a case **22** for housing a diode laser and its focusing optics, which are not shown in the drawing. The output laser beam exits the diode laser module **20** from the aperture **26** and is directed along the axis of the case **22**. An electrical link **23**, which may include one or more wires, connects the diode laser to the controller **40** as shown in FIG. **1**. Preferably, each wire is thin and flexible. A driving circuit of the diode laser can be installed either inside the case **22** or inside the controller **40**.

The output laser power from the diode laser module **20** should be about 5 mW, while a range of 1 mW to 100 mW may be used. The emitting wavelength of the diode laser module **20** is selected to have a desirable penetration depth for effectively stimulating an acupuncture point. For example, the laser wavelength may be at or around 635 nm to match the He—Ne laser or near 830 nm to increase the laser penetration depth. Any wavelength ranged from 500 nm to 1500 nm may be chosen for a variety of laser acupuncture treatments.

The diode laser module **20** is preferably compact and light. Commercial diode laser modules are available with approximately 1 cm in diameter, 2.5 cm in length, and a weight of 5 grams. Such laser modules can be used to implement the present invention.

FIG. 3 shows one embodiment **30** of a self-adhesive holder for attaching a diode laser module onto a patient's body. The holder **30** has a first end shaped to engage to the end of the case **22** and a second end having a self-adhesive surface **31** for sticking onto a body part **50**. The first end may have a counterbored hole **32** into which a diode laser module can inserted and held. Preferably, the holder **32** is configured to prevent the diode laser module **20** from contacting the body part **50**.

The holder **30** is preferably made of a flexible material with a low thermal conductivity, including but not limited to

soft plastic, foam paper, etc. In addition, the holder **30** may be a disposable item.

One embodiment of the controller **40** is shown in FIG. **4**. A DC power supply **42** provides electrical power to the diode laser modules **20**. A timer-controlled switch **41** is implemented to automatically turn on and off the power supply **42**. An electrical modulation circuit **43** modulates the electrical power to the diode laser modules **20**, thereby modulating the output laser power. Such modulation of the laser power is desirable for optimizing the stimulation of an acupuncture point. The timer-controlled switch **41** is used to control the duration of the laser acupuncture therapy, while the laser output modulator **43** the laser power for the procedure.

The above figures and description are intended for illustrating the present invention. It is understood that various modifications can be made without departing from the scopes of the invention as defined in the appended claims.

What is claimed is:

1. A multiple diode laser apparatus for laser acupuncture therapy, comprising:

a set of three or more diode laser modules, each having a diode laser to produce a laser beam at a selected wavelength that has a desired penetration depth into a patient's body part, and having a case for housing said diode laser;

a set of three or more holders respectively coupled to said set of diode laser modules, each configured to hold a diode laser module and having a self-adhesive surface to attach onto said body part to direct a laser beam to an acupuncture point in said body part without holding said respective diode laser module by a user's hand; and

a laser controller electrically connected to to provide electrical power to said diode laser modules and to control the output power of said laser beams for the laser acupuncture therapy.

2. An apparatus as in claim **1** wherein a number of said set of three or more diode laser modules ranges from 5 to 10.

3. An apparatus as in claim **1** wherein said selected wavelength is around 635 nm or 830 nm.

4. An apparatus as in claim **1** wherein said output power of said diode laser modules is approximately 5 mW.

5. An apparatus as in claim **1** wherein said diode laser module includes an optical focusing element for modifying said laser beam.

6. An apparatus as in claim **1** wherein said holder has a counterbored hole shaped to tightly hold said diode laser module.

7. An apparatus as in claim **1** wherein said holder is made of a flexible material with a low thermal conductivity.

8. An apparatus as in claim **1** wherein said laser controller comprises a timer operable to automatically turn on and off said electrical power to said diode laser.

9. An apparatus as in claim **1** wherein said diode laser modules each have a length of about 2.5 cm.

10. An apparatus as in claim **1** wherein said diode laser modules have each a weight of about 8 mg.

11. A method for constructing a laser apparatus and performing laser acupuncture therapy, comprising the steps:

providing a set of three or more diode laser modules, each having a diode laser to produce a laser beam at a selected wavelength and having a case for housing said diode laser;

engaging a holder to each diode laser module, said holder having a self-adhesive surface;

attaching each diode laser module onto said body part by said self-adhesive surface in such a way that each diode laser module is attached and positioned at respective acupuncture point without holding by a person's hand; and

providing electrical power to said diode laser modules and to control the output power of said laser beams for the laser acupuncture therapy.

12. A method as in claim **11** wherein said laser controller has a timer-controlled switch to control the duration of said laser acupuncture therapy.

13. A method as in claim **11** wherein said laser controller has a modulation circuit to modulate the output power of said laser beam for said laser acupuncture therapy.

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